

WE CLAIM:

1. A protein derived from an enterically transmitted non-A/non-B viral hepatitis agent whose genome contains a region which is homologous to a coding region of the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4 and having ATCC deposit no. 67717.

2. The protein of claim 1, which is encoded by a complete coding region within said 1.33 kb EcoRI insert.

3. A recombinant protein derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to a coding region of a DNA molecule having a first sequence (SEQ ID NO.1):

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AGACCTGTCC CTGTTGCAGC TATTCTACCA GCGTGCCCCG AGCTCGAACA GGGCCTTCTC 60
TACCTGCCCC AGGAGCTCAC CACCTGTGAT AATGTGCTAA CATTGAATT AACAGACATT 120
GTGCACTGCC GCATGCCCCG CCCGAGCCAG GCGAAGGCCG TGCTGTCCAC ACTCGTGGGC 180
CGCTACGGCG GTGCGACAAA GCTCTACAAT GCTTCCCACT CTGATGTTTG CGACTCTCTC 240
GCCCCTTTTA TCCCAGCCAT TGGCCCCGTA CAGGTTACAA CTTGTGAATT GTACGAGCTA 300
GTGGAGGCCA TGGTCCAGAA GGGCCAGGAT GGCTCCGCCG TCCTTGAGCT TGATCTTTGC 360
AACCGTGACG TGTCCAGGAT CACCTTCTTC CAGAAAGATT GTAACAAGTT CACCACAGGT 420
GAGACCATTG CCCATGGTAA AGTGGGCCAG GGCATCTCGG CCGGAGCAA GACCTTCTGC 480
GCCCTCTTTG GCCCTGGTT CCGCGCTATT GAGAAGGCTA TTCTGGCCCT GCTCCCTCAG 540
GGTGTGTTTT ACBGTGATGC CTTTGATGAC ACCGTCTTCT CGGCGGCTGT GGCCGCAGCA 600
AAGGCATCCA TGGTGTGTTGA GAATGACTTT TCTGAGTTTG ACTCCACCCA GAATAACTTT 660
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CTGTATCACC TTATAAGGTC TGGTGGATC TTGCAGGCCG CGAAGGAGTC TCTGCGAGGG 780
TTTTGGAAGA AACACTCCG GAGCCCCGCG ACTCTTCTAT GGAATACTGT CTGGAATATG 840
GCCGTTATTA CCCACTGTTA TGACTTCCGC GATTTTCAGG TGCTGCCTT TAAAGGTGAT 900
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GATTGATAG TGTATTGAG TGAATATGT TGAATGAG GAGGTGCTGT CCTGATCGCC 960  
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 5 GTGGCCCCCG GCTTGGGGC GTCCTGTAT GTTGTGGCT TCGCCGGCCG GCTTACCGAG 1080  
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 10 CTCGCAAGG TACGAATGT AGCTGAGATG TGTGTGATG TTGTTTCCCG TGTATTGGG 1200  
 GTTTCCTCTG GACTGTTCA TAACGTGAT GGCATGCTAC AGGCTGTTGC TGATGGCAAG 1260  
 GCACATTCA CTGAGTCAGT AAAAGCAATG CTGA 1295

a second sequence (SEQ ID NO.5):

TCGAGCACTG GTTTACTGA CTCAGTAAA TGTGCTTGC CATCAGCAAC AGCCTGTAGC 60  
 ATGCCAATCA GGTATGAAC GAGTCCAGG GAAACCCCAT AAACACGGGA AACAACATCC 120  
 20 ACACACATCT GAGCTACATT CGTGAGCTTG CGGAGGAAAT CACTAACAGC GAGGCGGAGC 180  
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 25 ACAACATCAG GGAGCGCGCC AAGGCCGGGG GCCACCACAA CACCTGCATA CAAACCGATC 300  
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 CTCTGACGAT ACTCACTGCA AAGCACTATC GAATCATCAC CTTTAAAGGC AGCCACCTGA 420  
 30 AAATCGCGGA AGTCATAACA GTGGGTAATA ACGGCCATAT TCCAGACAGT ATTCCATAGA 480  
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 55 TTGCGCTGGC TCGGGCGGC CATCGGCGAG TGCACAATGT CTGTTAATTC AAATGTTACG 1200

A C A C T A T C A C A G G T G S T G A G C T C C T G S S G C A G G T A G A G A A G G C C C T G T T C G A G C T C G G G G 1260  
 C A G G G T G G T A G A A C A G C T G C A A C A G G G A C A G G T C T 1295  
 5 a third sequence (SEQ ID NO.6):  
 A G G C A G A C C A C A T A T G T G G T G A T G C C A T G G A G S S C C A T C A G T T T A T T A A G G C T C C T 57  
 G G C A T C A C T A C T G C T A T T G A G C A G G C T G C T A G C A G C G G C C A A C T C T G C C C T G G C G A A T 117  
 10 G C T G T G G T A G T T A G S S C C T T T C T C T C T C A G C A G A T T G A G A C C C A T T A A C C T A A T G 177  
 C A A C C T C G C C A G C T T G T T T C G C C C C G A G G T T T C T G S A A T C A T C C C A T C C A G C G T G T C 237  
 A T C C A T A A C G A G C T G G A G C T T A C T G C C G C G C C G C T C C G G C G C T G T C T G A A A T T G G C 297  
 15 G C C C A T C C C C G C T C A A T A A A T G A T A A T C C T A A T G T G G T C C A C C G C T G C T T C C T C G C C C T 357  
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 30 C A C G A T G T C T C C A A C T T G C G C T C T G G A T T A G A A C C A C C A A G G T T A C C G G A G A C C A T C C C 777  
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 a fourth sequence (SEQ ID NO.10):  
 25 GCCATGGAGG CCCACCAGTT CATTAGGCT CCGGCATCA CTAAGCTAT TGAGCAAGCA 60  
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 GCGTATACC TTACACCCCG GCGGATCATT CATGCGGTGG CCCCAGCTA TCGATTGGAA 2580  
 55 CATAACCCCA AGAGGCTCGA GGCTGCTTAC CCGGAGACTT GCGCCGCGG AGGCACTGCT 2640



	GCCTATCCAC TCTTAGGGGC TGGCATTAG CAGGTGCGTG TTAGTTTGAG TTTTGATGCC	2700
	TGGGAGCGGA ACCACCGCGC GTTGAAGAG GTTACCTAA CAGAGCTGGC GGCTCGGTGG	2760
5	TTTGAATCCA ACCGCGCGG TCAGCGGAG TGAACATAA CTGAGGATAC CGCCCGTGCG	2820
	GCCAACTGG CCGTGGAGCT TGACTCGGG AGTGAAGTAG GCGCGCATG TGCCGGGTGT	2880
10	AAAGTCGAGC CTGGCGTTGT GCGGTATCAG TTTACAGCG GTGTCCCGG CTCTGGCAAG	2940
	TCAAAGTCG TGCAACAGGC GGATGTGGAT GTTGTGTG TGCCCACTCG CGAGCTTCGG	3000
	AACGCTTGGC GCGCGCGGG GTTGCAGCA TTAAGTCGCG AACTGCGGC CCGTGTCACT	3060
15	AGCGGCGTA GGGTTGTCAT TGATGAGGC CTTGCGTCC CCCCACACT GCTGCTTTTA	3120
	CATATGCAGC GTGCTGCATC TGTGCACCTC CTGGGGACC CGAATCAGAT CCCC GCCATA	3180
20	GATTTTGAGC ACACCGGTCT GATTCAGCA ATACGGCGG AGTTGGTCCC GACTTCATGG	3240
	TGGCATGTCA CCCACCGTTG CCGTGCAGAT GTCTGTGAGT TAGTCCGTGG TGCTTACCCT	3300
	AAAATCCAGA CTACAAGTAA GGTGCTCGT TCCCTTTCT GGGGAGAGCC AGCTGTCGGC	3360
25	CAGAAGCTAG TGTTACACA GGCTGCTAAG GCGCGCACC CCGGATCTAT AACGGTCCAT	3420
	GAGGCCAGG GTGCCACTTT TACCACTACA ACTATAATTG CAAGTCAGA TGCCCGTGGC	3480
30	CTCATACAGT CCTCCCGGC TACGCTATA GTTCTCTCA CTAGGCATA TGAAAAATGT	3540
	GTTATACTTG ACTCTCCCG CCGTCTCGT GAAGTGGGTA TCTCAGATGC CATTGTTAAT	3600
	AATTTCTCC TTTCCGGTGG CAGGTTGGT CACCAGAGAC CATCGGTCAT TCCGCGAGGC	3660
35	AACCCTGACC GCAATGTTGA CGTCTTGGC GCGTTCCAC CTTCATGCCA AATAAGCGCC	3720
	TTCCATCAGC TTGCTGAGGA GCTGGGCCAC CGGCCGCGC CGGTGGCGGC TGTGCTACCT	3780
40	CCCTGCCCTG AGCTTGAGCA GGGCCTTCT TATCTGCCAC AGGAGCTAGC CTCCTGTGAC	3840
	AGTGTGTGA CATTGAGCT AACTGACATT GTGCACTGCC GCATGGCGGC CCCTAGCCAA	3900
	AGGAAAGCTG TTTGTCCAC GCTGGTAGGC CGGTATGGCA GACGCACAAG GCTTTATGAT	3960
45	GCGGTCACA CCGATGTCCG CGCCTCCCT GCGCGCTTA TTCCCACTCT CGGGCGGGTT	4020
	ACTGCCACCA CCGTGAACCT CTTGAGCTT GTAGAGGCGA TGGTGGAGAA GGGCCAAGAC	4080
50	GGTTCAGCGC TCCTCGAGTT GGATTTGTG AGCGAGATG TCTCCGCGAT AACCTTTTTC	4140
	CAGAAGGATT GTAACAAGT CAGGAGGCG GAGACATTG CGCATGGCAA AGTCGGTCAG	4200
	GGTATCTTCC GCTGGAGTAA GAGTTTGT GCGCTGTTG GCCCTGGTT CCGTGCATG	4260
55	GAGAAGGCTA TTCTATCCCT TTTACACAA GCTGTGTTCT ACGGGGATGC TTATGACGAC	4320

	TCAGTATTCT CTGCTGCCGT GGCTGGCGCC AGCCATGCCA TGGTGTTGA AAATGATTTT	4380
	TCTGAGTTTG ACTCGACTCA GAATAACTTT TCCCTAGGTC TTGAGTGCGC CATTATGGAA	4440
5	GAGTGTGGTA TGCCCCAGTG GCTTGTCAGG TTGTACCATG CCGTCCGGTC GGCGTGGATC	4500
	CTGCAGGCCC CAAAAGAGTC TTGAGAGGG TTCTGGAAGA AGCATTCTGG TGAGCCGGGC	4560
10	AGCTTGCTCT GGAATACGGT GTGGAACATG GCAATCATTG CCCATTGCTA TGAGTTCCGG	4620
	GACCTCCAGG TTGCCGCCCT CAAGGGCGAC GACTCGGTGG TCCTCTGTAG TGAATACCGC	4680
	CAGAGCCGAG GCGCGGTTG GCTTATAGCA GGCTGTGGTT TGAAGTTGAA GGCTGACTTC	4740
15	CGGCCGATTG GGCTGTATGC CGGGGTTGTC GTGCCCCGG GGCTCGGGGC CCTACCCGAT	4800
	GTCGTTGAT TCGCCGAGC GCTTCGGAG AAGAACTGGG GGCTGATCC GGAGCGGGCA	4860
20	GAGCAGCTCC GCCTCGCCGT GCAGGATTTC CTCGTAGGT TAACGAATGT GGCCAGATT	4920
	TGTGTTGAGG TGGTGCTAG AGTTTACGGG GTTCCCCGG GTCTGGTTCA TAACCTGATA	4980
	GGCATGCTCC AGACTATTGG TGATGGAAG GCGCATTTTA CAGAGTCTGT TAAGCTATA	5040
25	CTTGACCTTA CACACTCAAT TATGCACCGG TCTGAATGAA TAACATGTGG TTTGCTGCGC	5100
	CCATGGGTTG GCCACCATGC GCCCTAGGCC TCTTTTGTG TTGTTCTCT TGTTCCTGCC	5160
30	TATGTTGCCC GCGCCACCGA CCGGTACCG GTCTGGCCGC CGTCGTGGGC GGCGCAGCGG	5220
	CGGTACCGGC GGTGGTTCT GGGGTGACCG GGTTGATTCT CAGCCCTTCG CAATCCCCTA	5280
	TATTCATCCA ACCAACCCCT TTGCCCCAGA CGTTGCCGCT GCGTCCGGGT CTGGACCTCG	5340
35	CCTTCGCCAA CCAGCCCGGC CACTTGGCTC CACTTGGCGA GATCAGGCC AGCGCCCTC	5400
	CGCTGCCTCC CGTCGCCGAC CTGCCACAGC CGGGGCTGCG GCGCTGACGG CTGTGGCGCC	5460
40	TGCCCATGAC ACCTCACCCG TCCCGGACGT TGATTCTCGC GGTGCAATC TACGCCGCA	5520
	GTATAATTTG TCTACTTCAC CCCTGACATC CTCTGTGGCC TCTGGCACTA ATTAGTCTT	5580
	GTATGCAGCC CCCCTTAATC CGCCTCTGCC GCTGCAGGAC GGTACTAATA CTCACATTAT	5640
45	GGCCACAGAG GCCTCCAATT ATGCACAGTA CCGGGTTGCC CGCGCTACTA TCCGTTACCG	5700
	GCCCCTAGTG CCTAATGCAG TTGGAGGCTA TGCTATATCC ATTTCTTTCT GGCTCAAAC	5760
50	AACCACAACC CCTACATCTG TTGACATGAA TTCCATTACT TCCACTGATG TCAGGATTCT	5820
	TGTTCAACCT GGCATAGCAT CTGAATTGGT CATCCCAAGC GAGCGCCTTC ACTACGCAA	5880
	TCAAGGTTGG CGCTCGGTTG AGACATCTGG TGTGCTGAG GAGGAAGCCA CCTCCGGTCT	5940
55	TGTCATGTTA TGCATACATG GCTCTCCAGT TAACTCCTAT ACCAATACCC CTTATACCGG	6000

	TGCCCTTGGC TACTGGACT TTGCCTAGA GCTTGAGTTT CGCAATCTCA CCACCTGTAA	6060
	CACCAATACA CGTGTGTCCC GTTACTCCAG CACTGCTCGT CACTCCGCCC GAGGGGCCGA	6120
5	CGGGACTGCG GAGGTGACCA CAAGTGCAGC CACCAGGTTT ATGAAAGATC TCCACTTTAC	6180
	CGGCCTTAAT GGGGTAGGTG AAGTCGCGG CGGGATAGCT CTAACATTAC TTAACCTTGC	6240
10	TGACACGCTC CTCGGCGGGC TCCGACAGA ATTAATTTCT TCGGCTGGCG GGCAACTGTT	6300
	TTATTCGCGC CGGTTGTCT CAGCCATGG CGAGCCAACC GTGAAGCTCT ATACATCAGT	6360
	GGAGAATGCT CAGCAGGATA AGGTTGTTC TATCCCCAC GATATCGATC TTGGTGATTC	6420
15	GCGTGTGGTC ATTGAGGATT ATGACAACCA GCATGAGCAG GATCGGCCCA CCCCCTCGCC	6480
	TGCGCCATCT CGGCCTTTT CTGTTCTCG AGCAATGAT GTACTTTGGC TGCCCTCAC	6540
	TGCAGCCGAG TATGACCACT CCACTTACGG GTCGTCAACT GGCCCGGTTT ATATCTCGGA	6600
20	CAGCGTGACT TTGGTGAATG TTGCGACTGG CGCGCAGGCC GTAGCCCGAT CGCTTGACTG	6660
	GTCCAAAGTC ACCCTCGAGC GCGGGGCGCT CCGACTGTT GAGCAATATT CCAAGACATT	6720
25	CTTTGTGCTC CCCCTTCGTG GCAAGCTCTC CTTTGGGAG GCCGGCACAA CAAAGCAGG	6780
	TTATCCTTAT AATTATAATA CTAAGCTAG TGACCAAGATT CTGATTGAAA ATGCTGCCGG	6840
	CCATCGGGTC GCCATTTCAA CCTATACCAC CAGGCTTGGG GCCGGTCCGG TCGCCATTTT	6900
30	TGCGGCCGCG GTTTTGGCTC CACGCTCCGC CCTGGCTCTG CTGGAGGATA CTTTGGATTA	6960
	TCCGGGGCGG GCGCACACAT TTGATGACTT CTGCCCTGAA TGCCGCGCTT TAGGCCTCCA	7020
35	GGGTTGTGCT TTCCAGTCAA CTGTGCTGA GCTCCAGCGC CTTAAAGTTA AGGTGGGTAA	7080
	AACTCGGGAG TTGTAGTTTA TTTGGCTGTG CCCACCTACT TATATCTGCT GATTTCTTTT	7140
40	ATTTCTTTT TCTGGTCCC GCGCTCCCTG A	7171
	or a fifth sequence (SEQ ID NO.12):	
	CGGGCCCCGT ACAGGTCACA ACCTGTGAGT GTACGAGCT AGTGGAGGCC ATGGTCGAGA	60
45	AAGGCCAGGA TGGCTCCGCC GTCTTGGC TCGATCTCTG CAACCGTGAC GTGTCCAGGA	120
	TCACCTTTT CCAGAAAGAT TGCAATAAGT TCACACGGG AGAGACCATC GCCCATGGTA	180
	AAGTGGGCCA GGGCATTTCT GCTGGAGTA AGACCTTCTG TGCCCTTTT GGGCCCTGGT	240
50	TCCGTGCTAT TGAGAAGGCT ATTCTGGCCC TGCTCCCTCA GGGTGTGTTT TATGGGGATG	300
	CCTTTGATGA CACCGTCTTC TCGCGCGCTG TGGCCGAGC AAAGGCGTCC ATGGTGTGTTG	360
55	AGAATGACTT TTCTGAGTTT GACTGCACCC AGAATAATTT TTCCCTGGGC CTAGAGTGTG	420
	CTATTATGGA GAAGTGTGGG ATGCGCAAGT GGTCATCCG CTTGTACCAC CTTATAAGGT	480

CTGCGTGGAT CCTGCAGGCC CCGAAGGAGT CCCTGCGAGG GTGTTGGAAG AAACACTCCG 540  
 GTGAGCCCGG CACTCTTCTA TGAATACTG TGTGGAACAT GGCCGTTATC ACCCATTGTT 600  
 5 ACGATTTCCG CGATTTCAG GTGGCTGCCT TTAAAGGTGA TGATTCGATA GTGCTTTGCA 660  
 GTGAGTACCG TCAGAGTCCA GGGGCTGCTG TCCTGATTGC TGGCTGTGGC TTAAAGCTGA 720  
 10 AGGTGGGTTT CCGTCCGATT GGTTCGTATG CAGGTGTTGT GGTGACCCCC GGCCCTGGCG 780  
 CGCTTCCCGA CGTCGTGGC TTGTCCGGCC GGCTTACTGA GAAGAATTGG GGCCCTGGCC 840  
 CTGAGCGGGC GGAGCAGCTC CGCCTTGCTG TCGC 874

15  
 or a sequence complementary thereto.

4. A protein which is (a) immunoreactive with  
 antibodies present in individuals infected with  
 20 enterically transmitted nonA/nonB hepatitis and (b)  
 derived from a viral hepatitis agent whose genome  
 contains a region which is homologous to the 1.33 kb  
 DNA EcoRI insert present in plasmid pTZXF1(ET1.1)  
 carried in E. coli strain BB4, and having ATCC  
 25 Deposit Nno. 67717.

5. The protein of claim 4, which is encoded by  
 a coding region within said 1.33 kb EcoRI insert.

30 6. A protein which is (a) immunoreactive with  
 antibodies present in individuals infected with  
 enterically transmitted nonA/nonB hepatitis and (b)  
 encoded by genetic sequence 406.3-2 or 406.4-2 or a  
 fragment thereof.

35 7. A method of detecting infection by  
 enterically transmitted nonA/nonB hepatitis viral  
 agent in a test individual, comprising:  
 providing a peptide antigen which is (a)  
 40 immunoreactive with antibodies present in individuals  
 infected with enterically transmitted nonA/nonB  
 hepatitis and (b) derived from a viral hepatitis agent  
 whose genome contains a region which is homologous to

the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4, and having ATCC deposit no. 67717,

5           reacting serum from the test individual with such antigen, and  
          examining the antigen for the presence of bound antibody.

8.   The method of claim 7, wherein the serum  
10   antibody is an IgM or IgG antibody, or a mixture of both, the antigen provided is attached to a support, said reacting includes contacting such serum with the support and said examining includes reacting the  
15   support and bound serum antibody with a reporter-labeled anti-human antibody.

9.   A kit for ascertaining the presence of serum  
antibodies which are diagnostic of enterically  
transmitted nonA/nonB hepatitis infection, comprising  
20   a support with surface-bound recombinant peptide antigen which is (a) immunoreactive with antibodies present in individuals infected with enterically transmitted nonA/nonB viral hepatitis agent and (b) derived from a viral hepatitis agent  
25   whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4, and having ATCC deposit no. 67717, and  
30   a reporter-labeled anti-human antibody.

10. A DNA fragment derived from an enterically  
transmitted nonA/nonB viral hepatitis agent whose  
genome contains a region which is homologous to the  
1.33 kb DNA EcoRI insert present in plasmid  
35   pTZKF1(ET1.1) carried in E. coli strain BB4 and having ATCC deposit no. 67717.

11. The fragment of claim 10, which is derived from said 1.33 kb EcoRI insert.

12. A DNA molecule comprising genetic sequence 406.3-2 or 406.4-2 or a fragment thereof, wherein said fragment comprises at least 12 consecutive nucleotides.

13. A DNA fragment derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to a DNA fragment within a first sequence (SEQ ID NO.1):

	AGACCTGTCC CTGTTGCAGC TGTTCACCA CCCTGCCCCG AGCTCGAACA GGGCCTTCTC	60
15	TACCTGCCCC AGGAGCTCAC CACCTGTGAT AGTGTCGTAA CATTGAATT AACAGACATT	120
	GTGCACTGCC GCATGGCCGC CCCGAGCCAG CGCAAGGCCG TGCTGTCCAC ACTCGTGGGC	180
	CGCTACGGCG GTCGCACAAA GCTCTACAAT GCTTCCCACT CTGATGTTTG CCACTCTCTC	240
20	GCCCGTTTTA TCCCGGCCAT TGGCQCCGTA CAGGTTACAA CTTGTGAATT GTACGAGCTA	300
	GTGGAGGCCA TGGTCGAGAA GGGCCAGGAT GGCTCCGCCG TCCTTGAGCT TGATCTTTGC	360
25	AACCGTGACG TGTCAGGAT CACCTTCTTC CAGAAAGATT GTAACAAGTT CACCACAGGT	420
	GAGACCATTG CCCATGGTAA AGTGGGCCAG GGCATCTCGG CCTGGAGCAA GACCTTCTGC	480
	GCCCTCTTTG GCCCTTGGTT CCGCGCTATT GAGAAGGCTA TTCTGGCCCT GCTCCCTCAG	540
30	GGTGTGTTTT ACGGTGATGC CTTTGATGAC ACCGTCTTCT CGGCGGCTGT GGCCGCAGCA	600
	AAGGCATCCA TGGTGTGTTGA GAATGACTTT TCTGAGTTTG ACTCCACCCA GAATACTTT	660
35	TCTCTGGGTC TAGAGTGTGC TATTATGGAG GAGTGTGGGA TGCCGCAGTG GTCATCCGC	720
	CTGTATCACC TTATAAGGTC TGGTGGATC TTGCAGGCCG CGAAGGAGTC TCTGCGAGGG	780
	TTTTGGAAGA AACACTCCGG TGAGCCCGGC ACTCTTCTAT GGAATACTGT CTGGAATATG	840
40	GCCGTTATTA CCCACTGTGA TGAATCCGC GATTTTCAGG TGGCTGCCTT TAAAGGTGAT	900
	GATTCGATAG TGCTTTGCAG TGAGTATCGT CAGAGTCCAG GAGCTGCTGT CCTGATCGCC	960
45	GGCTGTGGCT TGAAGTTGAA GGTAGATTTT CGCCCGATCG GTTTGTATGC AGGTGTTGTG	1020
	GTGGCCCCCG GCCTTGGCGC GCTCCCTGAT GTTGTGCGCT TCGCCGGCCG GCTTACCGAG	1080
50	AAGAATTGGG GCCCTGGCCC TGAGCGGGCG GAGCAGCTCC GCCTCGCTGT TAGTGATTTT	1140

CTCCGCAAGC TCACGAATGT AGGTGAGATG TGTGTGGATG TTGTTTCCCG TGTTTATGGG 1200

GTTTCCCCTG GACTCGTTCA TAACCTGATT GGCATGCTAC AGGCTGTTGC TGATGGCAAG 1260

5 GCACATTTCA CTGAGTCAGT AAAACCAATG CTGGA 1295

a second sequence (SEQ ID NO.5):

TCGAGCACTG GTTTTACTGA CTCAGTGAAT TGTGCTTGC CATCAGCAAC AGCCTGTAGC 60

10 ATGCCAATCA GGTATGAAC GAGTCCAGG GAAACCCAT AAACACGGGA AACAACATCC 120

ACACACATCT GAGTACATT CGTGAATTC GGAAGGAAT CACTAACAGC GAGGCGGAGC 180

TGCTCCGCC GGTGAGGGCC AGGGCCCAA TTCTTCTGG TAAGCCGGCC GGCGAAGCGC 240

15 ACAACATCAG GGAGCGGCC AAGGCCGGG GCAACCAAA CACCTGCATA CAAACCGATC 300

GGGCGGAAAT CTACCTTCAA CTCAAGCCA GAGCGGCGA TCAGGACAGC AGCTCCTGGA 360

20 CTCTGACGAT ACTCACTGCA AAGCACTATC GAATCATCAC CTTTAAAGGC AGCCACCTGA 420

AAATCGCGGA AGTCATAACA GTGGGTAATA ACGGCCATAT TCCAGACAGT ATTCCATAGA 480

AGAGTGCCGG GGTACCGGA GTGTTTCTC CAAACCCCTC GCAGAGACTC CTTCGGGGCC 540

25 TGCAAGATCC ACGCAGACCT TATAAGGTGA TACAGCGGA TGAGCCACTG CGGCATCCCA 600

CACTCCTCCA TAATAGCACA CTCTAGACCC AGAGAAAAGT TATTCTGGGT GGAGTCAAAC 660

30 TCAGAAAAGT CATTCTCAA CACCATGGAT GCCTTTGCTG CGGCCACAGC CGCCGAGAAG 720

ACGGTGTCT CATTAAGCATC ACCGTAAAC ACACCTGAG GGAGCAGGGC CAGAATAGCC 780

TTCTCAATAG CGCGGAACCA AGGGCCAAAG AGGGCGCAGA AGGTCTTGCT CCAGGCCGAG 840

35 ATGCCCTGGC CCACTTTACC ATGGGCAATG GTCTCACCTG TGGTGAACCT GTTACAATCT 900

TTCTGGAAGA AGGTGATCCT GGACACGTCA CGGTTGCAA GATCAAGCTC AAGGACGGCG 960

40 GAGCCATCCT GGCCCTTCTC GACCATGGCC TCCACTAGCT CGTACAATC ACAAGTTGTA 1020

ACCTGTACGG GGCAATGGC CGGATAAAA CGGGCGAGAG AGTCGGAAC ATCAGAGTGG 1080

GAAGCATTGT AGAGCTTTGT GCGACCGCC TAGCGGCCA CGAGTGTGGA CAGCACGGCC 1140

45 TTGCGCTGGC TCGGGGCGG CATGCGGAG TGCACAATGT CTGTTAATC AAATGTTACG 1200

ACACTATCAC AGGTGGTGAG CTCCTGGGG AGGTAGAGAA GGCCCTGTT CAGCTCGGGG 1260

50 CAGGGTGGTA GAACAGCTG AACAGGGACA GGTCT 1295

a third sequence (SEQ ID NO.6):

AGGCAGACCA CATATGTGGT CGATGCC ATGGAGGCC ATCAGTTTAT TAAGGCTCCT 57

55 GGCATCACTA CTGCTATTGA GCAGGCTGCT CTAGCAGCG CCAACTCTGC CCTGGCGAAT 117

	GCTGTGGTAG TTAGGCTTT TCTCTCTAC GAGCAGATTG AGATCCTCAT TAACCTAATG	177
5	CAACCTCGCC AGCTTGTTTT CCGCCCGAG GTTTTCTGGA ATCATCCCAT CCAGCGTGTC	237
	ATCCATAACG AGCTGBAGCT TTACTGCGC GCGCGCTCCG GCCGCTGTCT TGAAATTGGC	297
	GCCCATCCCC GGTCAATAAA TGATAATCCT AATGTGGTCC ACCGCTGCTT CCTCCGCCCT	357
10	GTTGGGCGTG ATGTTGAGCG CTGGTATACT GCTCCCACTC GCGGGCCGGC TGCTAATTGC	417
	CGGCGTTCCG CGCTGCGCGG GCTTCCCGCT GCTGACCGCA CTTACTGCCT CGACGGGTTT	477
15	TCTGGCTGTA ACTTTCCGCG CGAGACTGGC ATCGCCCTCT ACTCCCTTCA TGATATGTCA	537
	CCATCTGATG TCGCCGAGGC CATGTTCCGC CATGGTATGA CGCGGCTCTA TGCCGCCCTC	597
	CATCTTCCGC CTGAGGTCTT GCTGCCCCCT GGCACATATC GCACCGCATC GTATTTGCTA	657
20	ATTCATGACG GTAGGCGCGT TGTGGTGACG TATGAGGGTG ATACTAGTGC TGGTTACAAC	717
	CACGATGTCT CCAACTTGCG CTCCTGGATT AGAACCACCA AGGTTACCGG AGACCATCCC	777
25	CTCGTTATCG AGCGGGTTAG GGCCATTGCG TGCCACTTTG TTCTCTTGCT CACGGCAGCC	837
	CCGGAGCCAT CACCTATGCC TTATGTTCTT TACCCCGGT CTACCGAGGT CTATGTCCGA	897
	TCGATCTTCG GCCCGGGTGG CACCCCTTCC TTATTCCCAA CCTCATGCTC CACTAAGTCG	957
30	ACCTTCCATG CTGTCCCTGC CCATATTTGG GACCGTCTTA TGCTGTTCCG GGCCACCTTG	1017
	GATGACCAAG CCTTTTGCTG CTCCCGTTTA ATGACCTACC TTCGCGCAT TAGCTACAAG	1077
35	GTCACGTGTT GTACCCCTGT GGCTAATGAA GGCTGGAATG CCTCTGAGGA CGCCCTCACA	1137
	GCTGTTATCA CTGCCGCTA CCTTACCATT TGCCACCAGC GGTATCTCCG CACCCAGGCT	1197
	ATATCCAAGG GGATGCGTCG TCTGGAACGG GAGCATGCCC AGAAGTTTAT AACACGCCTC	1257
40	TACAGCTGGC TCTTCGAGAA GTCCGGCCGT GATTACATCC CTGGCCGTCA GTTGGAGTTC	1317
	TACGCCCAGT GCAGGCGCTG GCTCTCCGCC GGCTTTCATC TTGATCCACG GGTGTTGGTT	1377
45	TTTGACGAGT CGGCCCCCTG CCATTGTAGG ACCGCGATCC GTAAGGCGCT CTCAAAGTTT	1437
	TGCTGCTTCA TGAAGTGGCT TGGTCAGGAG TGCACCTGCT TCCTTCAGCC TGCAGAAGGC	1497
	GCCGTCGGCG ACCAGGGTCA TGATAATGAA GCCTATGAGG GGTCCGATGT TGACCCTGCT	1557
50	GAGTCCGCCA TTAGTGACAT ATCTGGGTCC TATGTCGTCC CTGGCACTGC CCTCCAACCG	1617
	CTCTACCAGG CCCTCGATCT CCCCCTGAG ATTGTGGCTC GCBCGGGCCG GCTGACCGCC	1677
	ACAGTAAAGG TCTCCAGGT CGATGGGCGG ATCGATTGCG AGACCCTTCT TGGTAACAAA	1737
55	ACCTTTCGCA CGTCGTTCTG TGACGGGGCG GTCTTAGAGA CCAATGGCCC AGAGCGCCAC	1797



	AATCTCTCCT TGGATGCCAG TCAGATCACT ATGCGCGCTG GCCCTTTCAG TCTCACCTAT	1857
	GCCGCCTCTG CAGCTGGGCT GGAGGTGGC TATGTTGCTG CCGGGCTTGA CCATCGGGCG	1917
5	GTTTTTGCCC CCGSTGTTTC ACCCGGCTA GCGCGGGG AGGTTACCGC CTTCTGCTCT	1977
	GCCCTATACA GGTTTAAGCG TGAGGCGCAG CGCATTCGC TGATCGGTAA CTTATGGTTC	2037
10	CATCCTGAGG GACTCATTGG CCTCTTCGCG CGGTTTTGCG CCGGGCATGT TTGGGAGTCG	2097
	GCTAATCCAT TCTGTGGGGA GAGCAGACTT TACACCGTA CTTGGTCGGA GGTGATGCC	2157
15	GTCTCTAGTC CAGCGCGGCC TGACTTAGST TTTATGCTG AGCCTTCTAT ACCTAGTAGG	2217
	GCCGCCACGC CTACCTGCG GCGCGCTTA CCGCGCGCTG CACCGGACCC TTCCCCCCT	2277
	CCCTCTGCCC CCGCGCTTGC TGAGCGGCT TCTGGCGCTA CCGCGGGGC CCGGCCATA	2337
20	ACTCACCAGA CCGCGCGGGA CCGCGCGCTG CTCTTCACCT ACCCGGATGG CTCTAAGGTA	2397
	TTGCGCGGCT CGCTGTTGGA GTCGACATGC ACGTGGCTCG TTAACGCGTC TAATGTTGAC	2457
	CACCGCCCTG GCGGGGGGCT TTGCCATGCA TTTTACCAA GGTACCCCGC CTCCTTTGAT	2517
25	GCTGCCTCTT TTGTGATGCG CGACGGGCGG GCGCGTACA CACTAACCC CCGGCCAATA	2577
	ATTCACGCTG TCGCCCTGA TTATAGGTTG GAACATAACC CAAAGAGGCT TGAGGCTGCT	2637
30	TATCGGGAAA CTTGCTCCCG CCTCGGCACC GCTGCATACC CGCTCCTCGG GACCGGCATA	2697
	TACCAGGTGC CGATCGGCCC CAGTTTTGAC GCCTGGGAGC GGAACCACCG CCGCGGGAT	2757
	GAGTTGTACC TTCCTGAGCT TGCTGCCAGA TGGTTTGAGG CCAATAGGCC GACCCGCCCG	2817
35	ACTCTACTA TAACTGAGGA TGTGACGCG ACAGCGAATC TGGCCATCGA GCTTGACTCA	2877
	GCCACAGATG TCGGCCGGGC CTGTGCCGCG TGTCGGGTCA CCGCGGCGT TGTTCACTAC	2937
40	CAGTTTACTG CAGGTGTGCC TGGATCGGC AAGTCCCGCT CTATACCCA AGCCGATGTG	2997
	GACGTTGTCG TGGTCCGAC GCGTGAGTTG CGTAATGCCT GCGCGCGTCG CGGCTTTGCT	3057
	GCTTTTACCC CGCATACTGC CGCCAGAGTC ACCCAGGGGC GCGGGTTGT CATTGATGAG	3117
45	GCTCCATCCC TCCCCCTCA CCTGCTGCTG CTCCACATGC AGCGGGCCGC CACCGTCCAC	3177
	CTTCTTGGCG ACCCGAACCA GATCCAGCC ATCGACTTTG AGCACGCTGG GCTCGTCCCC	3237
50	GCCATCAGGC CCGACTTAGG CCCCACCTCC TGGTGGCATG TTACCCATCG CTGGCCTGCG	3297
	GATGTATGCG AGCTCATCCG TGGTGATAC CCCATGATCC AGACCACTAG CCGGGTTCTC	3357
	CGTTCGTTGT TCTGGGGTGA GCCTGCCGTC GGGCAGAAAC TAGTGTTCAC CCAGGCGGCC	3417
55	AAGCCCGCCA ACCCGGGCTC AGTGACGCTC CACGAGGCGC AGGGCGCTAC CTACACGGAG	3477

	ACCACTATTA TTGGCAGAGC AGATGCGCGG GGCCTTATTC AGTCGTCTCG GGCTCATGCC	3537
5	ATTGTTGCTC TGACGCGCCA CACTGAGAAG TGCGTCATCA TTGACGCACC AGGCCTGCTT	3597
	CGCGAGGTGG GCATGTCGSA TGCAATCGTT AATAACTTTT TCCTCGCTGG TGGCGAAATT	3657
	GGTCACCAGC GCCCATCAGT TATTCGCCGT GGCAACCCGT ACGCCAATGT TGACACCCTG	3717
10	GCTGCCTTCC CGCGTCTTG CCAGATTAGT GCCTTCCATC AGTTGGCTGA GGAGCTTGGC	3777
	CACAGACCTG TCCTGTGTC AGCTGTTCTA CCACCCCTGCC CCGAGCTCGA ACAGGGCCTT	3837
15	CTCTACCTGC CCCAGGAGCT CACCACCTGT GATAGTGTG TAACATTTGA ATTAACAGAC	3897
	ATTGTGCACT GCCGCATGGC CGCCCCGAGC CAGCGCAAGG CCGTGCTGTC CACACTCGTG	3957
	GGCCGCTACG GCGGTGCGAC AAAGCTCTAC AATGCTTCCC ACTCTGATGT TCGCGACTCT	4017
20	CTCGCCCGTT TTATCCCGGC CATTGGCCCC GTACAGGTTA CAACTTGTA ATTGTACGAG	4077
	CTAGTGGAGG CCATGGTCGA GAAGGGCCAG GATGGCTCCG CCGTCCTTGA GCTTGATCTT	4137
25	TGCAACCGTG ACGTGTCCAG GATCACCTTC TTCCAGAAAG ATTGTAACAA GTTCACCACA	4197
	GGTGAGACCA TTGCCCATGG TAAAGTGGG CAGGGCATCT CGGCCTGGAG CAAGACCTTC	4257
	TGCGCCCTCT TTGGCCCTTG GTTCCGCGCT ATTGAGAAGG CTATTCTGGC CCTGCTCCCT	4317
30	CAGGGTGTGT TTTACGGTGA TGCTTTGAT GACACCGTCT TCTCGGCGGC TGTGGCCGCA	4377
	GCAAAGGCAT CCATGGTGTT TGAGAATGAC TTTTCTGAGT TTGACTCCAC CCAGAATAAC	4437
35	TTTTCTCTGG GTCTAGAGTG TGCTATTATG GAGGAGGTG GGATGCCGCA GTGGCTCATC	4497
	CGCTGTATC ACCTTATAAG GTCTGCGTGG ATCTTGCAAG CCCCGAAGGA GTCTCTGCGA	4557
	GGGTTTTGGA AGAAACACTC CGGTGAGCCC GGCACCTTC TATGGAATAC TGTCTGGAAT	4617
40	ATGGCCGTTA TTACCCACTG TTATGACTTC CGCGATTTTC AGGTGGCTGC CTTTAAAGGT	4677
	GATGATTCGA TAGTGCTTTG CAGTGAGTAT CGTCAGAGTC CAGGAGCTGC TGTCTGATC	4737
45	GCCGGCTGTG GCTTGAAGTT GAAGGTAGAT TTCCGCCCGA TCGGTTTGTA TGCAGGTGTT	4797
	GTGGTGGCCC CCGGCCTTGG CGCGCTCCCT GATGTTGTGC GCTTCGCCGG CCGGCTTACC	4857
	GAGAAGAATT GGGGCCCTGG CCCTGAGCGG GCGGAGCAGC TCCGCCTCGC TGTTAGTGAT	4917
50	TTCTCCGCA AGCTCACGAA TGTAAGTCAG ATGTGTGTGG ATGTTGTTTC CCGTGTAT	4977
	GGGGTTTCCC CTGGAATCGT TCATAACCTG ATTGGCATGC TACAGGCTGT TGCTGATGGC	5037
55	AAGGCACATT TCACTGAGTC AGTAAACCA GTGCTCGACT TGACAAATTC AATCTTGTGT	5097
	CGGGTGAAT GA ATAACATGTC TTTTGCTGCG CCCATGGGTT CGCGACCATG	5149

	CGCCCTCGGC CTATTTTGT GTGTGTCTC ATGTTTTGC CTATGCTGCC CGCGCCACCG	5209
5	CCCGGTCAAG CGTCTGGCG CGTGTGTGG CGGCGCAGCG GCGGTTCCCG CGGTGGTTTC	5269
	TGGGGTGACC GGGTTGATC TCAGGCTTC GCAATCCCT ATATTCAATC AACCAACCCC	5329
	TTCCGCCCCG ATGTACCGG TGGGGTGGG GTGTGACCTC GTGTTGCCA ACCCGCCCGA	5389
10	CCACTCGGCT CCGTTGGCG TGACGAGGC CAGCGCCCCG CCGTTGCCTC ACGTCGTAGA	5449
	CCTACCACAG CTGGGGCGG GCGCTAA CCGGGTGGC TCCGGCCAT GACACCCCGC	5507
15	CAGTGCTGA TGTGACTCC CGCGGGGCA TCTTGGCGG GCAGTATAAC CTATCAACAT	5567
	CTCCCTTAC CTCTTCGTG GCCACGGCA CTAACCTGGT TCTTTATGCC GCCCTCTTA	5627
	GTCCGCTTTT ACCCCTTCA GACGGCAGCA ATACCCATAT AATGGCCAG GAAGCTTCTA	5687
20	ATTATGCCA GTACCGGTT GCCCGTGCA CAATCCGTA CCGCCCGCTG GTCCCAATG	5747
	CTGTGGCGG TTACGCCATC TCCATCTAT TCTGGCCACA GACCACCACC ACCCGACGT	5807
25	CCGTTGATAT GAATCAATA ACCTGACGG ATGTTGTAT TTAGTCCAG CCCGGCATAG	5867
	CCTCTGAGCT TGTGATCCA AGTGAGCGC TACCTATCG TAACCAAGG TGGCGCTCCG	5927
	TCGAGACCTC TGGGGTGGT GAGGAGGAG CTACCTCTG TCTTGTATG CTTTGATAC	5987
30	ATGGCTCACT CGTAAATTC TATACTAATA CACCTATAC CCGTGCCCTC GGGCTGTTGG	6047
	ACTTTGCCCT TGAGCTTGAG TTTCGCAACC TTACCCCGG TAACCAAT ACAGGGGTCT	6107
35	CCCGTTATC CAGCACTGCT CGCCACCGC TTCGTCGCG TCGGACGGG ACTGCCGAGC	6167
	TCACCACCAC GGCTGCTACC CGCTTTATGA AGGACCTCTA TTTTACTAGT ACTAATGGT	6227
	TCGGTGAGAT CGGCGCGGG ATAGCCTCA CCTGTTCAC CCTTGCTGAC ACTCTGCTG	6287
40	GCGGCCTGCC GACAGAATTG ATTTCTCGG CTGGTGGCA GCTGTTCTAC TCCCGTCCG	6347
	TTGTCTCAGC CAATGGCGAG CCGACTGTA AGTTGTATAC ATCTGTAGAG AATGCTCAGC	6407
45	AGGATAAGG TATTGCAATC CCGCATGACA TTGACCTCG AGAATCTCGT GTGGTTATC	6467
	AGGATTATGA TAACCAACAT GAACAAGATC GGCCGACGC TTCTCCAGC CCATCGCGC	6527
	CTTTCTCTGT CTTTCGAGCT AATGATGTC TTTGGCTCTC TCTACCGCT GCCGAGTATG	6587
50	ACCAGTCCAC TTATGGCTCT TCGACTGGC CAGTTTATGT TTCTGACTCT GTGACCTTGG	6647
	TTAATGTTG GACCGGCGG CAGGCGTTC CCCGGTCGT CGATTGGACC AAGGTCACAC	6707
55	TTGACGGTCG CCCCCTCTC ACCATCAGC AGTACTGAA GACCTCTTT GTCTGCCGC	6767
	TCCGCGTAA GCTCTCTTC TGGGAGGAG GCACAACTAA AGCCGGGTAC CTTATAATT	6827

	ATAACACCAC TGCTAGCGAC CAACTGCTTG TCGAGAATGC CGCCGGGCAC CGGGTCGCTA	6887
	TTTCCACTTA CACCACTAGC CTGGGTGCTG GTCCCGTCTC CATTCTGCG GTTGCCGTTT	6947
5	TAGCCCCCA CTGTGCGTA GCATTGCTTG AGGATACCTT GGACTACCCT GCCCGCGCCC	7007
	ATACTTTTGA TGATTCTGC CCAGAGTGC GCCCCTTGG CCTTCAGGGC TGCCTTTTC	7067
10	AGTCTACTGT CGGTGAGCTT CAGCGCCTTA AGATGAAGGT GGGTAAACT CGGGAGTTGT	7127
	AG TTTATTTGCT TGTGCCCCC TTCTTCTGT TGCTTATTC TCATTTCTGC	7179
15	GTTCCGCGCT CCTGA	7195

a fourth sequence (SEQ ID NO.10):

	GCCATGGAGG CCCACCAGTT CATTAAGGCT CCTGGCATCA CTA CTGCTAT TGAGCAAGCA	60
	GCTCTAGCAG CGGCCAACTC CGCCCTTGG AATGCTGTGG TGGTCCGGCC TTTCTTTTC	120
20	CATCAGCAGG TTGAGATCCT TATAAATCTC ATGCAACCTC GGCAGCTGGT GTTTCGTCCT	180
	GAGGTTTTTT GGAATCACCC GATTCAACGT GTTATACATA ATGAGCTTGA GCAGTATTGC	240
25	CGTGCTCGCT CGGGTCGCTG CCTTGAGATT GGAGCCCACC CACGCTCCAT TAATGATAAT	300
	CCTAATGTCC TCCATCGCTG CTTCTCCAC CCCGTCGGCC GGGATGTTCA GCGCTGGTAC	360
30	ACAGCCCCGA CTAGGGGACC TGC <del>G</del> GCGAAC TGTGCGCGCT CGGCACTTCG TGGTCTGCCA	420
	CCAGCCGACC GCACTTACTG TTTGATGGC TTTGCCGGCT GCCGTTTTGC CGCCGAGACT	480
	GGTGTGGCTC TCTATTCTCT CCATGACTTG CAGCCGGCTG ATGTTGCCGA GGCATGGCT	540
35	CGCCACGGCA TGACCCGCCT TTATGCAGCT TTCCACTTGC CTCCAGAGGT GTCCTGCCT	600
	CCTGGCACCT ACCGGACATC ATCCTACTTG CTGATCCACG ATGGTAAGCG CGCGGTTGTC	660
40	ACTTATGAGG GTGACACTAG CGCCGGTTAC AATCATGATG TTGCCACCCT CCGCACATGG	720
	ATCAGGACAA CTAAGTTGT GGGTGAACAC CCTTTGGTGA TCGAGCGGGT GCGGGGTATT	780
	GGCTGTCACT TTGTGTTGTT GATCACTGCG GCCCTGAGC CCTCCCCGAT GCCCTACGTT	840
45	CCTTACCCGC GTTCGACGGA GGTCTATGTC CGGTCTATCT TTGGGCCCGG CGGGTCCCCG	900
	TCGCTGTTCC CGACCGCTTG TGCTGTCAAG TCCACTTTTC ACGCCGTCCC CACGCACATC	960
50	TGGGACCGTC TCATGCTCTT TGGGGCCACC CTCGACGACC AGGCCTTTTG CTGCTCCAGG	1020
	CTTATGACGT ACCTTCGTGG CATTAGCTAT AAGGTAAGTG TGGGTGCCCT GGTCGCTAAT	1080
	GAAGGCTGGA ATGCCACGA GGATGCGCTC ACTGCAGTTA TTACGGCGGC TTACCTCACA	1140
55	ATATGTCATC AGCGTTATTT GCGGACCCAG GCGATTTCTA AGGGCATGCG CCGGCTTGAG	1200

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	CGTGATTACA TCCCAGGCCG CCAGGTACAG TTCTACGCTC AGTGCCGCCG CTGGTTATCT	1320
5	GCCGGGTTCC ATCTCGACCC CGCAGCTTA GTTTTGATG AGTCAGTGCC TTGTAGCTGC	1380
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10	GAGTGTCTT GTTTCCTCCA GCGCGGAG GGGCTGGCG GCGACCAAGG TCATGACAAT	1500
	GAGGCCTATG AAGGCTCTGA TGTGATACT GGTGAGCTG CCACCTAGA CATTACAGGC	1560
	TCATACATCG TGGATGGTG GTCTCTGAA ACTGTCTATC AAGCTCTCGA CCTGCCAGCT	1620
15	GACCTGGTAG CTGCGGCAGC CCGACTCTCT GTACAGTTA CTGTTACTGA AACCTCTGGC	1680
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	GCACGCCTTG AGGTTAACGG GCGTACAG CTTAACCTCT CTTTGACAG CCAGCAGTGT	1800
20	AGTATGGCAG CCGGCCCGTT TTGCTCACC TATGCTGCC TAGATGGCGG GCTGGAAGTT	1860
	CATTTTTCCA CCGCTGGCT CGAGAGCGT GTTGTTTCC CCCCTGGTAA TGCCCCGACT	1920
25	GCCCCGCCA GTGAGGTCAC CGCTTCTGC TCAGCTCTT ATAGGCACAA CCGGCAGAGC	1980
	CAGCGCCAGT CGGTTATTGG TAGTTGTGG CTGACCCTG AAGGTTTGCT CGGCCTGTTT	2040
30	CCGCCCTTT CACCCGGGCA TGAGTGGCG TCTGCTAACC CATTTGCGG CGAGAGCACG	2100
	CTCTACACCC GCACTTGGT CACAATTACA GACACACCT TAACTGTCGG GCTAATTTCC	2160
	GGTCAATTGG ATGCTGCTCC CCACTCGGG GGGCCACCTG CTAAGCCAC AGGCCCTGCT	2220
35	GTAGGCTCGT CTGACTCTCC AGACCTGAC CCGCTACCTG ATGTTACAGA TGGCTACGC	2280
	CCCTCTGGG CCCGTCCGG TGGCCCAAC CCGAATGGC TTCCGCAGCG CCGCTTACTA	2340
40	CACACCTACC CTGACGGCG TAAGATCTAT GTCGGCTCA TTTTCGAGT TGAGTGCACC	2400
	TGGCTTGTA ACGCATCTAA CGCGGCCAC CGCCTGGT GCGGGCTTTG TCATGCTTTT	2460
	TTTCAGCGT ACCCTGATC GTTTGACGC ACCAAGTTG TGATGCGTGA TGGTCTGCG	2520
45	GCGTATACC TTACACCCG GCGATCATT CATGCGGTG CCCCAGCTA TCGATTGGAA	2580
	CATAACCCA AGAGGCTCGA GGCTGCCTAC CGGAGACTT GCGCCGCCG AGGCACTGCT	2640
50	GCCTATCCAC TCTTAGGCG TGGATTTAC CAGGTGCTG TTAGTTTGAG TTTTGATGCC	2700
	TGGGAGCGGA ACCACGCCG GTTTGACGAG CTTTACCTAA CAGAGCTGGC GGCTCGGTGG	2760
	TTTGAATCCA ACCGCCCCG TCAGCCACG TTGAACATAA CTGAGGATAC CGCCGTGCG	2820
55	GCCAACCTGG CCTGGAGCT TGAATCGGG AGTGAAGTAG GCCGCGCATG TGCCGGGTGT	2880

	AAAGTCGAGC CTGGCGTTGT GCGSTATCAG TTACAGCCG GTGTCCCCGG CTCTGGCAAG	2940
	TCAAAGTCCG TGCAACAGGC GGATGTGSAT GTTGTGTGTG TGCCCACTCG CGAGCTTCGG	3000
5	AACGCTTGGC GGCGCGGGG GTTSCGGCA TCACTCCGC AACTGCGGC CCGTGTCACT	3060
	AGCGGCCGTA GGGTTGTAT TGATGAGGC CTTTCGCTCC CCCCACACTT GCTGCTTTTA	3120
10	CATATGCAGC GTGCTGCATC TGTGCACCTC CTGGGGGACC CGAATCAGAT CCCC GCCATA	3180
	GATTTTGAGC ACACCGGTCT GATTCCAGCA ATACGGCCGG AGTTGGTCCC GACTTCATGG	3240
	TGGCATGTCA CCCACCGTTG CCCTGCAGAT GTCTGTGAGT TAGTCCGTGG TGCTTACCCT	3300
15	AAAATCCAGA CTACAAGTAA GGTGCTCCGT TCCCTTTTCT GGGGAGAGCC AGCTGTCGGC	3360
	CAGAAGCTAG TGTTACACA GGCTGCTAAG GCCGCGCACC CCGGATCTAT AACGGTCCAT	3420
20	GAGGCCCAGG GTGCCACTTT TACCACTACA ACTATAATTG CAACTGCAGA TGCCCGTGGC	3480
	CTCATACAGT CCTCCCGGGC TCACGCTATA GTTGCTCTCA CTAGGCATAC TGAAAAATGT	3540
	GTTATACTTG ACTCTCCCGG CCTGTTGCGT GAGGTGGGTA TCTCAGATGC CATTGTTAAT	3600
25	AATTTCTTCC TTTCCGGTGG CGAGGTTGGT CACCAGAGAC CATCGGTCAT TCCGCGAGGC	3660
	AACCCTGACC GCAATGTTGA CGTGCTTGGC GCGTTTCCAC CTTCATGCCA AATAAGCGCC	3720
30	TTCCATCAGC TTGCTGAGGA GCTGGGCCAC CGGCCGGCGC CGGTGGCGGC TGTGCTACCT	3780
	CCCTGCCCTG AGCTTGAGCA GGGCCTTCTC TATCTGCCAC AGGAGCTAGC CTCCTGTGAC	3840
	AGTGTGTGA CATTTGAGCT AACTGACATT GTGCACTGCC GCATGGCGGC CCCTAGCCAA	3900
35	AGGAAAGCTG TTTGTCCAC GCTGGTAGGC CGGTATGGCA GACGCACAAG GCTTTATGAT	3960
	GCGGGTCACA CCGATGTCCG CGCCTCCCTT GCGCGCTTTA TTCCCACTCT CGGGCGGGTT	4020
40	ACTGCCACCA CCTGTGA ACT CTTTGAGCTT GTAGAGGCGA TGGTGGAGAA GGGCCAAGAC	4080
	GGTTCAGCCG TCCTCGAGTT GGATTTGTGC AGCCGAGATG TCTCCGCAT AACCTTTTTC	4140
	CAGAAGGATT GTAACAAGTT CACGACCGGC GAGACAATTG CGCATGGCAA AGTCGGTCAG	4200
45	GGTATCTTCC GCTGGAGTAA GACGTTTTGT GCCCTGTTTG GCCCCTGGTT CCGTGCGATT	4260
	GAGAAGGCTA TTCTATCCCT TTTACCACAA GCTGTGTTCT ACGGGGATGC TTATGACGAC	4320
50	TCAGTATTCT CTGCTGCCGT GGCTGGCGCC AGCCATGCCA TGGTGTGTTGA AAATGATTTT	4380
	TCTGAGTTTG ACTCGACTCA GAATACTTT TCCCTAGGTC TTGAGTGGC CATTATGGAA	4440
	GAGTGTGGTA TGCCCCAGTG GCTTGTCAAG TTGTACCATG CCGTCCGGTC GCGTGGATC	4500
55	CTGCAGGCC CAAAAGAGTC TTTGAGAGGG TTCTGGAAGA AGCATTCTGG TGAGCCGGGC	4560

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5	CAGAGCCAG GCGCCGCTT GCTTATAGCA GGCTGTGCTT TGAAGTTGAA GGCTGACTTC	4740
	CGGCCGATTG GGCTGTATGC GGGGTTGTC GTGCCCCCGG GGCTCGGGGC CCTACCCGAT	4800
10	GTCGTTGAT TCGCCGAGC GCTTCCGAG AAGAACTGGG GGCTGATCC GGAGCGGGCA	4860
	GAGCAGCTCC GCTCGCGCT GAGGATTTC CTCCTAGGT TAACGAATGT GGCCAGATT	4920
	TGTGTTGAGG TGGTGTCTAG AGTTTACGG GTTCCCCCGG GTCTGGTTCA TAACCTGATA	4980
15	GGCATGCTCC AGACTATTGG TGATGGTAAG GCGCATTTTA CAGAGTCTGT TAAGCCTATA	5040
	CTTGACCTTA CACACTCAAT TATGCACCGG TCTGAATGAA TAACATGTGG TTTGCTGCGC	5100
20	CCATGGGTTT GCCACCATGC GGCCTAGGCC TCTTTTGCTG TTGTTCTCTT TGTTCCTGCC	5160
	TATGTTGCCC GCGCCACCGA CCGGTCAGCC GTCTGGCCGC CGTCGTGGGC GGCGCAGCGG	5220
	CGGTACCGGC GGTGGTTTCT GGGGTGACCG GGTGATTCT CAGCCCTTCG CAATCCCCTA	5280
25	TATTCATCCA ACCAACCCTT TTGCCCCAGA CGTTGCCGCT GCGTCCGGGT CTGGACCTCG	5340
	CCTTCGCCAA CCAGCCCGGC CACTTGGCTC CACTTGGCGA GATCAGGCCC AGCGCCCTC	5400
30	CGCTGCCTCC CGTCGCCGAC CTGCCACAGC CGGGGCTGCG GCGCTGACGG CTGTGGCGCC	5460
	TGCCCATGAC ACCTACCCG TCCCGACGT TGATTCTCGC GGTGCAATTC TACGCCGCA	5520
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35	GTATGCAGCC CCCCTAATC CGCCTCTGCC GCTGCAGGAC GGTACTAATA CTCACATTAT	5640
	GGCCACAGAG GCCTCCAATT ATGCAAGTA CCGGGTTGCC CGCGCTACTA TCCGTTACCG	5700
40	GCCCCTAGTG CCTAATGCAG TTGGAGGCTA TGCTATATCC ATTTCTTTCT GGCCTCAAAC	5760
	AACCACAACC CCTACATCTG TTGACATGAA TTCCATTACT TCCACTGATG TCAGGATTCT	5820
	TGTTCAACCT GGCATAGCAT CTGAATTGGT CATCCCAAGC GAGCGCCTTC ACTACCGCAA	5880
45	TCAAGGTTGG CGCTCGGTTG AGACATCTGG TGTGCTGAG GAGGAAGCCA CCTCCGGTCT	5940
	TGTCATGTTA TGCATACATG GCTCTCCAGT TAACTCTAT ACCAATACCC CTTATACCGG	6000
50	TGCCCTTGGC TTA CTGGACT TTGCCTTAGA GCTTGAGTTT CGCAATCTCA CCACCTGTAA	6060
	CACCAATACA CGTGTGTCCC GTTACTCCAG CACTGCTCGT CACTCCGCC GAGGGGCCGA	6120
	CGGGACTGCG GAGCTGACCA CAACTGCAGC CACCAGGTTT ATGAAAGATC TCCACTTTAC	6180
55	CGGCCTTAAT GGGGTAGGTG AAGTCGGCG CGGGATAGCT CTAACATTAC TTAACCTTGC	6240

	TGACACGCTC CTGGGGGGG TCCGACAG ATTAAATTTG TCGGCTGGCG GGCAACTGTT	6300
	TTATTCGGC CCGTTGTCT CAGCAATGG CGAGCCAACC GTGAAGCTCT ATACATCAGT	6360
5	GGAGAATGCT CAGCAGGATA AGGGTGTGG TATCCCCAC GATATCGATC TTGGTGATTC	6420
	GGGTGTGGT ATTGAGGATT ATGACAGCA GCATGAGCAG GATCGGCCCA CCCCCTCGCC	6480
	TGCGCCATCT CGGCCTTTT CTGTTCTCG AGCAATGAT GTACTTTGGC TGTCCCTCAC	6540
10	TGCAGCCGAG TATGACAGT CCACTTAGG GTGTCAACT GGCCCGGTTT ATATCTCGGA	6600
	CAGCGTGACT TTGGTGAATG TTGCGACTGG CGCGCAGGCC GTAGCCCGAT CGCTTGACTG	6660
15	GTCCAAAGTC ACCCTCGAGG GGCGGCCCT CCCGACTGTT GAGCAATATT CCAAGACATT	6720
	CTTTGTGCTC CCCCTCGTG GCAAGCTCTC CTTTGGGAG GCCGGCACAA CAAAAGCAGG	6780
	TTATCCTTAT AATTATAATA CTACTGCTAG TGACCAGATT CTGATTGAAA ATGCTGCCGG	6840
20	CCATCGGGTC GCCATTTCAA CCTATACCAC CAGGCTTGGG GCCGGTCCGG TCGCCATTTT	6900
	TGCGGCCGCG GTTTTGGCTC CAGGCTCCG CCTGGCTCTG CTGGAGGATA CTTTGTATTA	6960
25	TCCGGGGCGG GCGCACACAT TTGATGACTT CTGCCCTGAA TGCCGCGCTT TAGGCCTCCA	7020
	GGGTTGTGCT TTCCAGTCAA CTGTCGCTGA GCTCCAGCGC CTAAAGTTA AGGTGGGTAA	7080
	AACTCGGGAG TTGTAGTTTA TTTGGCTGTG CCCACCTACT TATATCTGCT GATTTCTTTT	7140
30	ATTTCTTTT TCTCGGTCCC GCGCTCCCTG A	7171

or a fifth sequence (SEQ ID NO.12):

35	CGGGCCCCGT ACAGGTCACA ACCTGTGAGT. TGACGAGCT AGTGGAGGCC ATGGTCGAGA	60
	AAGGCCAGGA TGGCTCCGCC GTCCTTGAGC TCGATCTCTG CAACCGTGAC GTGTCCAGGA	120
	TCACCTTTTT CCAGAAAGAT TGCAATAAGT TCACCACGGG AGAGACCATE GCCCATGGTA	180
40	AAGTGGGCCA GGGCATTTCG GCCTGGAGTA AGACCTTCTG TGCCCTTTTC GGCCCTGGT	240
	TCCGTGCTAT TGAGAAGGCT ATTCTGGCCC TGCTCCCTCA GGGTGTGTTT TATGGGGATG	300
	CCTTTGATGA CACCGTCTTC TCGGCGCGTG TGGCCGAGC AAAGGCGTCC ATGGTGTGTTG	360
45	AGAATGACTT TTCTGAGTTT GACTCCACCC AGAATAATTT TTCCCTGGGC CTAGAGTGTG	420
	CTATTATGGA GAAGTGTGGG ATGCCGAAGT GGCTCATCCG CTTGTACCAC CTTATAAGGT	480
50	CTGCGTGGAT CCTGCAGGCC CCGAAGGAGT CCCTGCGAGG GTGTTGGAAG AAACACTCCG	540
	GTGAGCCCGG CACTCTTCTA TGAATACTG TCTGGAACAT GGCCGTTATC ACCCATTTGT	600
	ACGATTTCCG CGATTTGCAG GTGGCTGCCT TAAAGGTGA TGATTGATA GTGCTTTGCA	660
55	GTGAGTACCG TCAGAGTCCA GGGGCTGCTG TCCTGATTGC TGGCTGTGGC TAAAGCTGA	720



	AGGTGGGTTT CCGTCCGATT GGTTCCTATG CAGGTGTGTG GGTGACCCCC GGCCTTGGCG	780
	CGCTTCCCGA CGTCGTGGCG TTGTCCGGGC GGCTTACTGA GAAGAATTGG GGCCCTGGCC	840
5	CTGAGCGGGC GGAGCAGCTC CGCCTTGGTG TGGG	874

or a sequence complementary thereto.

10           14. A kit comprising, in a container or separate  
containers, a pair of single-strand primers derived  
from nonhomologous regions of opposite strands of a  
DNA duplex fragment derived from an enterically  
transmitted viral hepatitis agent whose genome  
15 contains a region which is homologous to the 1.33 kb  
DNA EcoRI insert present in plasmid pTZKF1(ET1.1)  
carried in E. coli strain BB4 and having ATCC deposit  
no. 67717.

20           15. The kit of claim 15, which are derived from  
opposite strands of the EcoRI duplex insert in said  
plasmid.

25           16. A method for detecting the presence of an  
enterically transmitted nonA/nonB hepatitis viral  
agent in a biological sample, comprising  
          preparing a mixture of duplex DNA fragments  
derived from the sample,  
          denaturing the duplex fragments,  
30           adding to the denatured DNA fragments, a pair of  
single-strand primers derived from nonhomologous  
regions of opposite strands of a DNA duplex fragment  
derived from an enterically transmitted viral  
hepatitis agent whose genome contains a region which  
35 is homologous to the 1.33 kb DNA EcoRI insert present  
in plasmid pTZKF1(ET1.1) carried in E. coli strain  
BB4, and having ATCC deposit no. 67717,  
          hybridizing said primers to homologous-sequence  
region of opposite strands of such duplex DNA

fragments derived from enterically transmitted nonA/nonB hepatitis agent,

5        reacting the primed fragment strands with DNA polymerase in the presence of DNA nucleotides, to form new DNA duplexes containing the primer sequences, and repeating said denaturing, adding, hybridizing and reacting steps, until a desired degree of amplification of sequences is achieved.

10        17. The method of claim 16, wherein the primers are derived from opposite strands of the EcoRI duplex insert in said plasmid.

15        18. The method of claim 16, for detecting the presence of viral agent in a sample of cultured cells infected with the agent.

20        19. A vaccine for immunizing an individual against enterically transmitted nonA/nonB hepatitis viral agent comprising, in a pharmacologically acceptable adjuvant, a recombinant protein derived from an enterically transmitted nonA/nonB viral hepatitis agent whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid pTZ-RF1(ET1.1) carried in E. coli strain BB4, and having ATCC deposit no. 67717.

25        20. The vaccine of claim 19, wherein the protein is derived from the EcoRI insert in said plasmid.

30

21. A vaccine for immunizing an individual against HEV comprising, in a pharmacologically acceptable adjuvant, a protein encoded by genetic sequence 406.3-2 or 406.4-2 or a fragment thereof.

35

22. In a method of isolating an enterically transmitted nonA/nonB viral agent or a nucleic acid fragment produced by the agent, an improvement which

comprises: utilizing, as a source of said agent, bile obtained from a human or cynomolgus monkey having an active infection of enterically transmitted non-A/non-B hepatitis.

5

23. The method of claim 22, wherein the bile is obtained from an infected cynomolgus monkey.

10 24. Human polyclonal anti-serum obtained from a human immunized with a protein derived from an enterically transmitted non-A/non-B viral hepatitis agent whose genome contains a region which is homologous to the 1.33 kb DNA EcoRI insert present in plasmid pTZKF1(ET1.1) carried in E. coli strain BB4  
15 and having ATCC deposit no. 67717.

ADD  
ALL